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EXAMINER

BUEKER, RICHARD R

ART UNIT	PAPER NUMBER
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1763

DATE MAILED: 06/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

10/629,029

Applicant(s)

SHERO ET AL.

Examiner

Richard Bueker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 76-117 is/are pending in the application.
- 4a) Of the above claim(s) 103-111 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 76-102 and 112-117 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 4 sheets. (10/20/03; 3/18/04; 4/26/04 + 12/28/04)
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_.

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 76-102 and 112-117, drawn to an apparatus, classified in class 118, subclass 726.
- II. Claims 103-111, drawn to a method, classified in class 427, subclass 248.1.ccls.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used without pulsing.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

This application contains claims directed to the following patentably distinct species of the claimed invention:  $\text{HfCl}_4$  and  $\text{ZrCl}_4$  as the solid source composition.

Applicant is required under 35 U.S.C. 121 to elect a single disclosed species for prosecution on the merits to which the claims shall be restricted if no generic claim is finally held to be allowable. Currently, claims 76-87 and 90-117 are generic.

Applicant is advised that a reply to this requirement must include an identification of the species that is elected consonant with this requirement, and a listing of all claims readable thereon, including any claims subsequently added. An argument that a claim

is allowable or that all claims are generic is considered nonresponsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

Should applicant traverse on the ground that the species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C. 103(a) of the other invention.

During a telephone conversation with Mr. Akhtar on June 14, 2005 a provisional election was made without traverse to prosecute the invention of Group I, claims 76-102 and 112-117, and the species of  $\text{HfCl}_4$ . Affirmation of this election must be made by applicant in replying to this Office action. Claims 89 and 103-111 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claims 87, 88 and 90-102 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. In claim 87, it is unclear if "a solid

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source for vapor reactant” in line 6 is intended to be the same solid source for vapor reactant that is recited in line 5, or a different solid source. In claim 88, the phrase “the solid source for vapor reactant coating” lacks proper antecedent basis because claim 87 recites “a solid source for vapor reactant”, which is not the same language.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 76-78, 81, 83 and 85 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Lei (6,718,126). Lei discloses a sublimation apparatus for supplying precursor vapor to an ALD chamber, the sublimation apparatus comprising a support medium onto which a solid source for vapor reactant is coated. The support medium is configured to guide carrier gas through the support medium to facilitate saturation of the carrier gas with vapor of the solid source material. The coated support of Lei inherently or obviously forms a bed as claimed in claim 76.

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Claims 84, 86, 87, 90, 91, 93, 94 and 96-98 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lei (6,718,126). Lei teaches (col. 4, lines 1-12) that it is desirable to maximize the surface area of the support medium with respect to the volume of the support medium. Therefore it would have been obvious to achieve a high surface to volume ratio as recited in claim 87. Regarding claim 90, Lei's vessel is inherently capable of convective transfer to the same extent as applicants' vessel. It is noted that applicants' specification defines convective transfer as flow caused by a pressure differential.

Claims 79 and 80 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lei (6,718,126) taken in view of Raaijmakers (2001/0024387) (see para. 91, for example), who teaches that a mechanism for providing pluses of gas is a conventional part of an ALD system, and it would have been obvious to one skilled in the art to provide the ALD apparatus of Lei with a gas pulsing mechanism in view of Raaijmakers.

Claims 82, 83 and 94-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lei (6,718,126) in view of Tasaki (5,904,771). Tasaki (Figs. 1-4, for example) discloses a solid source vaporizer comprising a plurality of packed flowable support elements. Tasaki teaches that his vaporizer provides a desirably uniform gas concentration for long periods of time, and for that reason it would have been obvious to one skilled in the art to use the vaporizer of Tasaki as the vapor source for an ALD chamber of the type taught by Lei.

Claim 88 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lei (6,718,126) taken in view of Londergan (6,720,259) (col. 3, lines 53-64), who teaches

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the use of a solid source of  $\text{HfCl}_4$  with carrier gas for ALD processes. It would have been obvious to one skilled in the art to use the solid source vaporizer of Lei for supplying  $\text{HfCl}_4$  because Lei teaches that his vaporizer is effective for vaporizing solid sources.

Claims 92 and 96-98 rejected under 35 U.S.C. 103(a) as being unpatentable over Lei (6,718,126) taken in view of Onoe (6,270,839) (see Figs. 1 and 3, for example), who teaches the use of a manifold to supply carrier gas to a solid source vaporizer. It would have been obvious to use a manifold as shown by Onoe to supply carrier gas to Lei's vessel to provide more even distribution of gas.

Claims 112-117 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gartner (4,883,362). Gartner discloses a sublimation apparatus for producing a vapor reactant comprising a sublimation vessel containing a bed of solid source material in the form of powder, and a guidance structure that provides a substantially helical pathway for carrier gas. The vessel has an inlet port and an outlet port and a coiled flow path 70 to 100 cm in length. Gartner doesn't state the distance between the inlet and outlet, but it is clear from Gartner's disclosure that the helical pathway is inherently or at least obviously greater than about 2.5 times the distance between inlet and outlet. Gartner's apparatus includes stacked plates, which can be considered to be stacked trays that "partially" define the helical pathway.

Claims 112-114 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Wen (5,553,395) (Fig. 3 and

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abstract) who discloses a sublimation apparatus comprising a sublimation vessel containing a bed of solid source material in powder form. The walls of the vessel form a carrier gas guidance structure that causes the carrier gas to flow with a "whirlpool effect" that inherently causes the gas to flow in a helical path.

Claims 112-117 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Gregg (2004/0016404) who discloses a sublimation apparatus comprising a sublimation vessel containing a bed of solid source material in powder form, including plural guide trays. Gregg teaches (para. 58) that his trays include guiding structures that cause carrier gas flow with a "whirlpool effect" that inherently causes the gas to flow in a helical path.

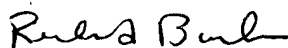
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard Bueker  
Primary Examiner  
Art Unit 1763